

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPLICATION NO.: 10/787,292  
FILING DATE: FEBRUARY 26, 2004  
APPELLANT: JOHN J. VAJO ET AL.  
GROUP ART UNIT: 1754  
CONFIRMATION NO.: 4952  
EXAMINER: WAYNE A. LANGE  
TITLE: HYDROGEN STORAGE MATERIALS AND METHODS  
INCLUDING HYDRIDES AND HYDROXIDES  
ATTORNEY DOCKET: 8540R-000070 (GP-303955)

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MS Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**REPLY BRIEF FILED UNDER 37 C.F.R. § 41.41**

I. Status of Claims

Claims 1-199 are pending. Claims 1-9, 12-16, 18-22, 24, 25, 27-30, 70, 73-84, 87-90, 92-98, 102-118, 121-129, 131-138, 178, 179 and 181-194 are finally rejected. Claims 195-199 were withdrawn from consideration pursuant to a restriction requirement. Claims 10, 11, 17, 23, 26, 31-69, 71, 72, 85, 86, 91, 99-101, 119, 120, 130, 139-177 and 180 are objected to for being based upon rejected parent claims, however, contain allowable subject matter. The claims on appeal are all of the claims finally rejected, Claims 1-9, 12-16, 18-22, 24, 25, 27-30, 70, 73-84, 87-90, 92-98, 102-118, 121-129, 131-138, 178, 179 and 181-194.

II. Grounds of Rejection to Be Reviewed On Appeal

Claims 1-9, 12-16, 18-22, 24, 25, 27-30, 70, 73-84, 87-90, 92-98, 102-118, 121-129, 131-138, 178, 179 and 181-194 stand rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Chen et al. (U.S. Pat. No. 6,471,936).

### III. Argument

In response to the Examiner's Answer mailed on August 31, 2007, please consider Appellants' Reply, as set forth herein, which supplements Appellants' Appeal Brief filed on June 13, 2007.

**The Chen Reference Does Not Anticipate Nor Render Obvious Claims 1-9, 12-16, 18-22, 24, 25, 27-30, 70, 73-84, 87-90, 92-98, 102-118, 121-129, 131-138, 178, 179 and 181-194.**

Claims 1-9, 12-16, 18-22, 24, 25, 27-30, 70, 73-84, 87-90, 92-98, 102-118, 121-129, 131-138, 178, 179 and 181-194 are patentable over Chen (U.S. Pat. No. 6,471,936), because the Chen reference fails to teach or enable the claimed methods of producing hydrogen or claimed hydrogen storage compositions having hydride and hydroxide compositions.

The Examiner relies upon the Chen reference for allegedly disclosing a method of producing hydrogen by conducting a reaction between a hydride composition and a hydroxide composition. However, the Chen reference fails to describe, either explicitly or inherently, that hydrogen is produced in a reaction between a hydride and a hydroxide composition, such as is found in independent Claims 1, 82, and 178. Similarly, Claim 111 is directed to a hydrogen storage composition having a hydrogenated state with a hydroxide and a hydride and a dehydrogenated state with an oxide. Claim 187 provides a mixture of a hydroxide and a hydride to promote release of hydrogen in the presence of a catalyst, elevated temperature, or both.

The Chen reference pertains to two entirely independent steps. The first is directed to preparing a carbon-based sorbent material by doping with alkali metal(s). The Chen reference describes adding alkali metal salts to carbon materials in a calcination reaction to change the structural and electronic properties of the carbon material. Col. 2, lines 47-54. The second

aspect is directed to using the pre-formed alkali-metal doped carbon-based sorbent for reversible storage of hydrogen gas. Thus, after forming the doped carbon-based sorbent in the first step, Chen subsequently reversibly stores and releases hydrogen from the pre-formed sorbent. The Chen reference does not teach or enable a hydrogen generation reaction in either step, but rather provides a preparation step and a hydrogen adsorption/desorption step.

The anticipation/obviousness rejection over Chen is inadequate because it relies on one of skill in the art speculating as to which subset of conditions in Chen might potentially produce hydrogen. In order for claims to be anticipated, the same predictable and repeatable results must result from the prior art's teachings.

"Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1951 (Fed. Cir. 1999) (citations and internal quotation marks omitted).

Furthermore, it is well-settled that the prior art disclosure must be adequate to enable possession of the claimed subject matter in order to anticipate under §102. *See Elan Pharmaceuticals, Inc. v. Mayo Foundation for Medical Education and Research*, 346 F.3d 1051, 1055 (Fed. Cir. 2003). It is insufficient for a reference to name or describe the desired subject matter, if it cannot be produced without undue experimentation, in other words, if the disclosure is not enabling to one of skill in the art. *See id.* Thus, claims are not anticipated where the asserted prior art merely sets forth mere probabilities or possibilities that something might result from a given set of circumstances. *Mehl/Biophile Int'l Corp. v. Milgram*, 52 USPQ2d 1303, 1305 (Fed. Cir. 1999) (citing *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)).

In the present context, there is no description or teaching in the Chen reference regarding methods of producing hydrogen, nonetheless any potential guidance or description regarding selecting the appropriate salts to produce hydrogen, nor the favorable reaction conditions (inert atmosphere or a reducing atmosphere, time, pressure, temperature, and the like) that might facilitate the potential ancillary production of hydrogen during the primary calcination reaction. The Chen reference generally describes “doping of alkali metals to the carbon materials may be achieved by a solid state reaction between the carbon materials and alkali metal salts” by generally using “alkali metal salts [that] may include carbonates, nitrates, hydroxides, halogenides, acetates, hydrides, nitrates, or the like.” Col. 5, lines 17-19 and 44-46. However, Chen provides no specificity as to any particular selection or combination of alkali metal salts, nor even that a plurality of salts should be selected. In fact, to the extent that specific combinations of the alkali metal salts are required to arrive at the claimed invention, Chen states that the selected salts preferably lack oxygen (*e.g.*, are not hydroxides) for the calcination process. Since Chen fails to teach or describe reacting specific compositions to produce hydrogen or provide guidance as to specific hydroxide and hydride compositions to perform the hydrogen generation reaction, it would require undue experimentation from one of skill in the art to arrive at the various reaction conditions and compositions that would successfully provide a hydrogen production reaction. Hence, Chen is inapposite to producing hydrogen via a hydrogen generating reaction or providing a hydrogen storage material including hydroxide and hydride compositions, as claimed. The Chen reference fails to enable the claimed invention and for this additional reason, does not inherently anticipate or render the claimed invention obvious.

As such, Chen fails to enable mixtures or combinations of hydroxide and hydride compositions for use in a hydrogen production reaction or for use in a hydrogen storage material.

For all of these reasons and those set forth in the Appeal Brief, Appellants submit that Claims 1-9, 12-16, 18-22, 24, 25, 27-30, 70, 73-84, 87-90, 92-98, 102-118, 121-129, 131-138, 178, 179 and 181-194 are not anticipated or rendered obvious by the Chen reference and request that the rejection be REVERSED.

Dated: October 31, 2007

Respectfully submitted,

HARNESS, DICKEY & PIERCE, P.L.C.  
P.O. Box 828  
Bloomfield Hills, Michigan 48303  
(248) 641-1258

Attorney for Appellants

By Jennifer Woodside Wojtala  
Jennifer M. Woodside Wojtala  
Registration No.: 50,721

Correspondence Address:  
John Card  
Kathryn A. Marra  
General Motors Corporation  
Legal Staff - Mail Code 482-C23-B21  
PO Box 300 - 300 Renaissance Center  
Detroit, Michigan 48265-3000  
(313)665-4708

AMB/JMW